Mathematics – III

Max. Marks: 20

Time 1:30 Hrs.

Ans 1. Show that Cauchy-Riemann Equation in Polar form are $\frac{\partial u}{\partial r} = \frac{1}{r}\frac{\partial v}{\partial \theta}$; $\frac{\partial v}{\partial r} = -\frac{1}{r}\frac{\partial u}{\partial \theta}$

Deduce that $\frac{\partial^2 u}{\partial r^2} + \frac{1}{r}\frac{\partial u}{\partial r} + \frac{1}{r^2}\frac{\partial^2 u}{\partial \theta^2} = 0$

OR Determine the Analytic function whose real part is $\log \sqrt{x^2+y^2}$ (10)

Ans 2 If $f(z)$ is a regular function of z.

prove that $\left[\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right] |f(z)|^2 = 4|f'(z)|^2$.

OR. In a given race the odds in favour of four horses A, B, C, D are 1:3, 1:4, 1:5, 1:6 respectively. Assuming that dead-heat is impossible, find the chance that one of them wins the race. (10)